FORAGE SUITABILITY GROUP

Sodic, Sodic/Saline "LRU H"

10 - 14" ppt & > 120 Freeze Free Days

FSG No.: GO58BH027WY

Major Land Resource Area (MLRA) : 58B – Northern Rolling High Plains, Southern Part

Physiographic Features

This area is considered the Northern Rolling High Plains, Southern Part with a little over one-third of the area being federally owned. The remainder of the area is privately owned. The elevation ranges from 2,952 to 5,905 feet (900 to 1,800 meters) increasing gradually from North to South. These dissected plains are underlain by shale and sandstone. The majority of this area is in grasses and shrubs. Slopes are mostly gently rolling to steep, with wide belts of steeply sloping badlands bordering a few of the river valleys. In some places, flat-topped, steep-sided buttes arise sharply above the general level of the plains. Gently sloping deep soils make up approximately 4 to 5 per cent of the area and are in dry cropland. Narrow strips of land along the Tongue, Powder, and Platte Rivers and some of their tributaries are irrigated.

Climatic Features

Annual precipitation ranges from 12 - 19 inches per year with isolated areas of precipitation upwards of 20 inches per year. Maximum precipitation occurs in the spring and early autumn. Precipitation in the winter is snow. Relative humidity is low. Winds are estimated to have higher velocities in the spring and lower velocities in the summer.

Temperatures are subject to wide ranges, both seasonal and day to night. The high elevation of the plains and the dry air in this area permit large amounts of incoming and outgoing radiation, giving rise to warm days and cool nights. Late spring and early fall freezes are common, because of the cold air outbreaks from Canada, high elevation and rapid nighttime cooling. The cold air outbreaks from Canada generally do not last long, as their path is generally southeasterly, then easterly in these latitudes. Sunshine is quite abundant with few days during the year without some sunshine.

The low and erratic precipitation is the principal source of water for agriculture. Water for livestock is usually stored in small reservoirs, but supplies are inadequate for significant irrigation. Irrigation water in quantity is available only along the major rivers and some of their larger tributaries. Ground water is scarce in most of the area.

This is in Land Resource Area "H". The precipitation in this LRU is 10 to 14 inches and has a freeze free period greater than 120 days.

There is a wide variation in freeze free days and precipitation in this MLRA. Please be sure and visit with the local field office for site specific climatic information that is available in the Field Office Technical Guide, Section I, Climatic Data, http://www.nrcs.usda.gov/technical/efotg/ or refer to the National Water and Climate Center web page at http://www.wcc.nrcs.usda.gov.

Soil Interpretations

This group consists of deep, medium textured soils. The soils have a water holding capacity (AWC) of greater than 3 inches in 60 inches of root depth.

Sodicity refers to soil exchange capacity and the degree to which sites are occupied by sodium ions, as compared to more preferred calcium and magnesium ions. The soils have an Electrical Conductivity (EC) of less than or equal to 16 mmhos/cm in 24 inches. The pH is greater than 5.5. The Sodium Absorption Ratio (SAR) is greater than 13 in 12 inches.

The soil survey maps were completed for the purposes of developing plans for tracts of land and can not be used to determine the soils on or the suitability of a specific site. Consequently, small areas of significantly different soils are not identified on the maps and may occur in any map unit.

Refer to Appendix A, Forage Suitability Group Rules in Section II, of the Field Office Technical Guide, Pastureland and Hayland Interpretations for the parameters used in grouping the soils.

Soil Map Unit List

For a complete listing of soil components and what Forage Suitability Group the soil is in, refer to Appendix B, Section II of the Field Office Technical Guide, Pastureland and Hayland Interpretations.

Adapted Species List

Refer to Appendix C, Adapted Species for Forage Suitability Groups in Section II of the Field Office Technical Guide, Pastureland and Hayland Interpretations.

Production Estimates

Production estimates are based on management intensity (fertility regime, irrigation water management, harvest timing, etc.) and should be considered as estimates only. The estimates should only be used for making general management recommendations. On site production information should always be used for making detailed planning and management recommendations when available.

The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields, and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses.

The production estimates listed below represent total annual above ground plant production on an air-dry-matter basis. Production on pastures in many instances is species dependent and depends if the pasture is a single species pasture or a mixture of grass species. To convert the information below to AUM's (Animal Unit Months), multiply the pounds per acre by 35 per cent and then divide by 790 (example: assume 2,800 pounds per acre: 2,800 X .35 ÷ 790 = 1¼ AUM's).

Irrigation: The expected production for grass would be from 1,500 to 2,500 pounds per acre. The expected production for legumes would range from 2 to 3 tons per acre.

Dryland: The expected production for grass would be from 275 to 600 pounds per acre. The expected production for legumes would range from 1 to 2 tons per acre.

Forage Growth Curves

LRU H

Growth Curve Number: WY0012
Growth Curve Name: Cool Season Grass
Growth Curve Description: Dryland (10 – 14" precipitation)

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	35	40	10	5	5	0	0	0

Growth Curve Number: WY0013
Growth Curve Name: Cool Season Grass
Growth Curve Description: Irrigated (10 – 14" precipitation)

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	30	25	15	5	0	0	0

Growth Curve Number: WY0010
Growth Curve Name: Legumes
Growth Curve Description: Irrigated (10 – 14" precipitation)

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	20	20	20	10	5	0	0

Growth Curve Number: WY0011
Growth Curve Name: Legumes/Cool Season Grass
Growth Curve Description: Irrigated (10 – 14" precipitation)

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	30	20	10	15	10	5	0	0

Growth Curve Number: WY0003
Growth Curve Name: Legumes
Growth Curve Description: Dryland (10 – 14" precipitation)

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	25	20	25	5	0	0	0

Growth Curve Number: WY0004
Growth Curve Name: Legumes/Cool Season Grass
Growth Curve Description: Dryland (10 – 14" precipitation)

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	30	30	15	5	10	0	0	0

Growth Curve Number: WY0005
Growth Curve Name: Warm Season Grass
Growth Curve Description: Dryland (10 – 14" precipitation)

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0		10	40	35	15		0	0	0

Management

The relationship between soils, vegetation and climate on any given site is historically driven by the ability of the plants to grow and change as conditions warrant and has allowed various species to express themselves naturally. Under agronomic conditions, production-enhancing practices have altered the original limits of the biomass production. The modification of growth factors, customized selection of species and wise use of a variety of management practices have the potential to produce yields and quality far superior to those found in the native state.

These soils when in forage management system should see organic matter at a steady or a slowly climbing state. If erosion from either wind or water is a concern, the current erosion prediction tool should be used to ensure that the erosion concern is addressed properly. Refer to the pasture and hayland planting standard or the forage harvest standard in the Field Office Technical Guide, Section IV for further management information.

Plant growth is adversely affected in sodic soils due to one or more factors. Soil sodicity problems can cause dense, impermeable surface crusts that hinder emergence of seedlings. Excess exchangeable sodium in sodic soils has a marked influence on the physical soil properties. As the proportion of exchangeable sodium increases, the soil tends to become more dispersed which results in the breakdown of soil aggregates and lowers the permeability of the soil to air and water.

Soils saturated with sodium tend to be very difficult to work with. These soils are sometimes consolidated, blocky and poorly drained. These soils we often refer to as "gumbo". Sodic soils are treated by replacing adsorbed sodium with a soluble source of calcium. Native gypsum, calcium in irrigation water or commercial amendments can supply the calcium. Adequate drainage also must be present.

Soil salinity problems can result from dryland saline seeps (caused by a perched water table resulting from clay hardpans or shale subsoil), improper drainage, or water management on irrigated soils, or cultivation of naturally saline soils. Soil salinity is strongly linked to water movement through the soil profile. When sub-soil moisture containing salts moves upwards and evaporates, salts are precipitated at or near the soil surface. The solution to salinity problems lies in the prevention of upward salt movement; this requires such actions as utilization of existing soil moisture, the prevention of additional water moving into the system and/or site drainage. Drainage by tiling or ditching is generally not advised because of the potential for both surface and groundwater contamination. Changes in cultural practices can be effective. The use of deep-rooted perennial crops will also retard or prevent moisture movement into effected areas. On irrigated sites, irrigation water management is critical. Irrigation timing, duration, and the disposal of wastewater all influence the movement of salts.

Soil amendments such as gypsum ($CaSO_4$), calcium chloride dihydrate (Ca Cl_2-2h2O), and sulfuric acid (H_2SO_4) have been used for the reclamation of saline-sodic soils. These amendments generally involve the replacement of exchangeable Na^+ with Ca^{++}. For amendments to be effective, the displaced sodium must be leached out of the plant-rooting zone. This is not always possible because of water availability and/or poor drainage from the salinized site. However, even without leaching, amending with gypsum will reduce surface crusting and improve moisture penetration.

FSG Documentation

Data References:

Agriculture Handbook 296 - Land Resource Regions and Major Land Resource Areas
Natural Resources Conservation Service, National Water and Climate Center (NWCC)
National Soil Survey Center, National Soil Information System (NASIS)
National Range and Pasture Handbook
Natural Resources Conservation Service, Field Office Technical Guide (FOTG)
Various Agriculture Research Service (ARS), Cooperative Extension Service (CES), and Natural Resources Conservation Service (NRCS) information on plant trials for adaptation and production.
"Dryland Pastures in Montana and Wyoming" Species and Cultivars, Seeding Techniques and Grazing Management, Montana State University, EB19

State Correlation:

This site has been correlated with the following states:

Forage Suitability Group Approval:

Original Author:	Douglas A. Gasseling, CPAg, CPESC, CCA
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Approval by:	Paul Shelton
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